

Drzewa rozpinające

给定一个长为 n 的整数序列 a_1, a_2, \dots, a_n 。根据这个序列你可以生成一个 n 个节点的无向图：节点 i 和 j 之间（对于 $i \neq j$ ）有 $\gcd(a_i, a_j)$ 条可区分的边将这两个节点相连。你的任务是计算这个图的生成树数量。如果对于两棵树，其中一棵树包含另一棵树中不存在的边，那么就认为这两棵树不同。因为生成树数量很大，请输出它对 $10^9 + 7$ 取模后的值。 $n \leq 5000$ 。

Walizki

Byteasar 负责评估新规划的 Byteburg Bitom 机场的行李大厅的设计。根据规划，大厅里将有 n 个平台，用 1 到 n 的整数编号，每个行李箱最初都要运输到第一个平台。一些单向传送带可以从平台出发，连接到编号严格更大的平台。如果一个平台没有传送带出口，在这个平台的行李箱将由机场工作人员手动拿走并转移到相应的飞机上。另一方面，如果平台接有多条出口传送带，那么传送带的顺序就很重要——第一个行李箱遇到这样的平台，就会从第一条传送带上离开，第二个就会从第二条上离开，以此类推。当行李箱从最后一条传送带离开平台时，下一个行李箱又会从第一条传送带离开，如此循环往复。

一旦一个行李箱被送到第一个平台，它在传送带上的运输和工作人员的收集都在下一个行李箱放在第一个平台之前进行。换句话说，在任何时候，最多只有一个行李箱在传送带上运输。

可以想见，在处理了一定数量的行李箱后，这个行李系统会「复位」，即回到对于每个有出口传送带的平台，行李箱到达平台后都从第一条出口传送带离开状态。Byteasar 想知道最少处理多少行李箱之后，系统将自我复位。请帮他计算出这个值！ $n \leq 100$ 。

每个点都归位了等价于所以每个点都被经过度数的倍数次，所以我们直接算每个点会经过总次数的多少份之多少：

$$f_u \cdot \frac{1}{d} \rightarrow f_v \quad (1)$$

我们用个高精度分数类来算就好了。

No Bug No Game

Putata is preparing the RPG Pro League (RPL) held by the International Computer Playing Company (ICPC). In this RPG game, the player will wear n items at the same time. Each item can offer the player several points of power. There is a magic buff in the game, which can upgrade each item such that they can offer several points of bonus power.

However, the buff is limited, it can only buff at most k points of power. Formally, assume the player is wearing nothing initially, and then will wear all the n items one by one. The game server will scan through all these n items one by one, according to the permutation that the player wears them. When the server is scanning the i -th item, which can offer p_i points of power, let $sum = \sum_{1 \leq j < i} p_j$ denoting the total points of power scanned before:

- If $sum + p_i \leq k$, the whole item will be upgraded. The buff will offer w_{i,p_i} points of bonus power.
- If $sum \geq k$, the item won't be upgraded. The buff will offer nothing.
- Otherwise, only a part of the item will be upgraded. The buff will offer $w_{i,k-sum}$ points of bonus power.

Putata is clever, he soon realized that he can adjust the permutation to wear these n items to gain more points of bonus power! Unfortunately, Putata doesn't know the optimal permutation, please write a program to help him.

The behavior of the magic buff performed by the game server is a bug. The game code can work all thanks to bugs, so it is possible that $w_{i,a} > w_{i,b}$ where $a < b$.

Input

The first line contains two integers n and k ($1 \leq n \leq 3000$, $0 \leq k \leq 3000$), denoting the number of items and the limit k .

Each of the following n lines starts with an integer p_i ($1 \leq p_i \leq 10$), denoting the base power of the i -th item, followed by p_i integers $w_{i,1}, w_{i,2}, \dots, w_{i,p_i}$ ($1 \leq w_{i,j} \leq 10^5$).

对于跨过了 k 的那个怪兽，对于它前面的怪兽，距离都至少是 $p_i + 1$ ，后面的怪兽，贡献肯定是 0。所以我们枚举这格关键怪兽，枚举它和 k 之间的差，再算出前缀背包和后缀背包，总复杂度 $O(nk|p|)$ 。

RPG Pro League

The International Computer Playing Company (ICPC) is recently scheduling the annual RPG Pro League (RPL). In the RPG game, there are three kinds of different roles: Damager, Synergier, and Buffer. A team consists of exactly four players. Only the following two types of teams are allowed in RPL:

- One Damager, two Synergiers, and one Buffer.
- Two Damagers, one Synergier, and one Buffer.

Before the real competition, the ICPC decides to hold an exhibition game. There are n players, labeled by $1, 2, \dots, n$. The i -th player can only play roles in set S_i , and the price to invite him to participate in the exhibition game is p_i dollars.

You are working for the ICPC. Your job is to select which players to invite such that they can make the maximum number of valid teams, and the total cost is minimized. Note that a player can not join multiple teams.

Unfortunately, the players may always adjust their prices. You will be given q events, in each event, the price of a player will be changed. Your task is to report the current minimum total cost for maximizing the valid teams after each event.

首先可以给那个 **two** 单独建一个人，于是就变成了一个左部 n 点、右部 4 点的二分图最大权匹配问题，考虑先 Hall 定理求出最大流，模拟费用流求出一个最小费用最大流。然后单点修改，再消负环。

然后发现有权值的只有和源点相连的左部点之间的边，那么只要找到这两条边之间能到达，且一个大于另一个，就找了负环。维护右部点两两可达性，然后直接枚举环就好。 $O((n+q) \log n)$ 。

Guess Cycle Length

This is an interactive problem.

Grammy has a directed cyclic graph of n vertices ($1 \leq n \leq 10^9$) numbered from 1 to n . A directed cyclic graph is a directed graph of n vertices that form one cycle. Specifically, there are n vertices and n edges in the graph, and there exists a permutation p_1, p_2, \dots, p_n such that there is a one-way edge from p_i to $p_{(i \bmod n)+1}$.

Initially, there is a token on a predetermined vertex.

You can ask Grammy to move the token in the following way:

“walk x ” where $0 \leq x \leq 10^9$. In response to the query, Grammy will move the token through exactly x edges and tell you the position of the token after moving.

You win if you guess the number of vertices in the hidden graph (number n) by making no more than 10^4 queries.

The vertices in the graph and the initial position of the token are fixed in advance.

考虑交互器后台肯定是个随机数生成器和一个 `map`，这随机数做不到太均匀，所以中位数、平均数都不好用，随机询问 4000 次，拿个最大值来当 n 的大致估计，然后一一 check。

但是 check 实际上可以用 BSGS 的思想来进行，就能 check 3000^2 个数，这就稳了。